WHAT IS CLAIMED IS:

1. In packet communication between a communication apparatus including at least a transmitting unit and one or more other communication apparatuses including at least a receiving unit, an acoustic signal packet
5   communicating method comprising:

in the transmitting unit,

the step of dividing an acoustic signal such as a voice or music signal into given time segments called frames to generate a frame acoustic signal;

10   the step of generating data corresponding to the frame acoustic signal (hereinafter referred to as "acoustic signal corresponding data") from the frame acoustic signal; and

the step of containing the frame acoustic signal and the acoustic signal corresponding data in packets and transmitting the packets;

15   in the receiving unit,

the step of storing received packets in a receiving buffer;

the step of specifying the frame number of a frame to be extracted;

a loss detecting step of determining whether or not a packet containing a frame acoustic signal associated with the frame number of the
20   frame to be extracted is stored in the receiving buffer;

if it is determined in the loss detecting step that a packet containing the frame acoustic signal associated with the frame number of the frame to be extracted is stored in the receiving buffer, an acoustic signal packet decoding step of extracting the frame acoustic signal from the packet stored in the
25   receiving buffer and providing the frame acoustic signal as a frame output signal;

if it is determined in the loss detecting step that the packet

containing the frame acoustic signal associated with the frame number of the frame to be extracted is not stored in the receiving buffer (hereinafter referred to as "if a packet loss occurs"), a loss handling step of extracting acoustic signal corresponding data for the frame (hereinafter referred to as a "lost frame") from a packet stored in the receiving buffer and generating a frame output acoustic signal by using the acoustic signal corresponding data; and

the step of concatenating frame output acoustic signals outputted from the acoustic signal packet decoding step or the loss handling step and outputting a concatenated frame output acoustic signal;

the acoustic signal packet communicating method being characterized by comprising the steps of:

in the transmitting unit, including, in the same packet that contains a frame acoustic signal, acoustic signal corresponding data for a frame having a frame number different by a value specified by delay amount control information from the frame number of the packet and delay amount control information and transmitting the packet; and

in the receiving unit, if a packet loss occurs, obtaining acoustic signal corresponding data having the same frame number as that of a lost frame from the packet in the receiving buffer by using the delay amount control information included in the packet.

2. The acoustic signal packet communicating method according to claim 1, characterized in that, in packet communication between one communication apparatus including both of the transmitting unit and the receiving unit and one or more other communication apparatuses including both of the transmitting unit and the receiving unit, the acoustic signal packet communicating method comprising:

in the receiving unit,

both or one of a first determining step of determining a jitter state of a received packet and a second determining step of determining a loss state of a received packet; and

the step of using the result of the determination made in any of the

5   determining steps to determine the number of packets to be stored in the receiving buffer (hereinafter referred to as the "targeted value of the number of stored packets"); and

in the transmitting unit in the same communication apparatus that includes the receiving unit,

10   the step of setting the delay amount control information to a value smaller than or equal to the targeted value of the number of the stored packets.

3.   The acoustic signal packet communicating method according to claim 1, characterized in that, in packet communication between one

15   communication apparatus including both of the transmitting unit and the receiving unit and one or more other communication apparatus including both of the transmitting unit and the receiving unit, the acoustic signal packet communicating method comprising,

in the receiving unit,

20   both or one of a first determination step of determining a jitter state of a received packet and a second determination step of determining a loss state of a received packet; and

the step of using the result of the determination made in the determination step to determine the number of packets to be stored in the

25   receiving buffer (hereinafter referred to as the "targeted value of the number of stored packets"); and

the step of sending the targeted value of the number of stored

packets to the transmitting unit in the same communication apparatus; and

in the transmitting unit in the same communication apparatus that includes the receiving unit,

the step of containing the targeted value of the number of stored

5 packets sent from the receiving unit in a packet as information for specifying delay amount control information to be set in the transmitting unit at the other end of communication.

4. The acoustic signal packet communicating method according to claim 1, characterized in that, in communication between one communication

10 apparatus including both of the transmitting unit and the receiving unit and one or more other communication apparatuses including both of the transmitting unit and the receiving unit, the acoustic signal packet communicating method comprising:

in the receiving unit,

15 the step of measuring the number of packets stored in the receiving buffer (hereinafter referred to as the "remaining buffer amount"); and

the step of sending the remaining buffer amount to the transmitting unit in the same communication apparatus; and

in the transmitting unit in the same communication apparatus that

20 includes the receiving unit,

the step of containing the remaining buffer amount sent from the receiving unit in a packet as information for specifying delay amount control information to be set in the transmitting unit at the other end of communication and transmitting the packet.

25 5. In communication between one communication apparatus including at least a transmitting apparatus and one or more communication apparatus including at least a receiving unit, an acoustic signal packet

transmitting method comprising the steps of:

in the transmitting unit,

dividing an acoustic signal such as a voice or music signal into given time segments called frames to generate a frame acoustic signal;

5   generating data corresponding to the frame acoustic signal (hereinafter referred to as "acoustic signal corresponding data") from the frame acoustic signal; and

containing the frame acoustic signal and the acoustic signal corresponding data in packets and transmitting the packets,

10   the acoustic signal packet transmitting method characterized by comprising the step of, in the transmitting unit, including, in the same packet that contains the frame acoustic signal, acoustic signal corresponding data for a frame having a frame number different by a value specified by delay amount control information from that of the packet and the delay amount

15   control information and transmitting the packet. ·

6. The acoustic signal packet transmitting method according to claim 5, characterized in that, in communication between one communication apparatus including both of the transmitting unit and the receiving unit and one or more other communication apparatuses including both of the

20   transmitting unit and the receiving unit,

the acoustic signal packet transmitting method comprises the step of, in the transmitting unit, setting the delay amount control information to a value smaller than or equal to the number of packets to be stored in the receiving unit in the same communication apparatus that include the

25   transmitting unit, the number of packets being determined at that receiving unit.

7. The acoustic signal packet transmitting method according to

claim 5, characterized in that,

in communication between one communication apparatus including both of the transmitting unit and the receiving unit and one or more other communication apparatuses including both of the transmitting unit and the

5   receiving unit;

the acoustic signal packet transmitting method comprises the step of:

in the transmitting unit;

containing in a packet the number of the packets to be stored in the

10 receiving unit of the same communication apparatus that includes the transmitting unit, the number of packets being determined at that receiving unit, as information for specifying delay amount control information to be set in the transmitting unit at the other end of communication and transmitting the packet.

15   8.   The packet transmitting method according to claim 5, characterized in that, in communication between one communication apparatus including both of the transmitting unit and the receiving unit and one or more other communication apparatuses including both of the transmitting unit and the receiving unit,

20   the acoustic signal packet transmitting method comprises the step of:

in the transmitting unit,

containing in a packet the number of packets stored in the receiving buffer that is measured in the receiving unit in the same communication

25 apparatus that includes the transmitting unit, as information for requesting to set delay amount control information to be set in the transmitting unit at the other end of communication.

9. In packet communication between one communication apparatus including at least a transmitting unit and one or more other communication apparatuses including at least a receiving unit, an acoustic signal packet receiving method comprising:

5   in the receiving unit,

the step of storing received packets in a receiving buffer;

the step of specifying the frame number of a frame to be extracted;

a loss detecting step of determining whether or not a packet containing a frame acoustic signal associated with the frame number of the

10 frame to be extracted is stored in the receiving buffer;

if it is determined at the loss detecting step that a packet containing the frame acoustic signal associated with the frame number of the frame to be extracted is stored in the receiving buffer, an acoustic signal packet decoding step of extracting the frame acoustic signal from the packet stored in the

15 receiving buffer and providing the frame acoustic signal as a frame output acoustic signal;

if it is determined in the loss detecting step that the packet containing the frame acoustic signal associated with the frame number of the frame to be extracted is not stored in the receiving buffer (hereinafter referred

20 to as "if a packet loss occurs"), a loss handling step of extracting data (hereinafter referred to as "acoustic signal corresponding data") corresponding to the acoustic signal in the frame (hereinafter referred to as the "lost frame") from a packet stored in the receiving buffer and generating a frame output acoustic signal by using the acoustic signal corresponding data;

25 and

the step of concatenating frame output acoustic signals outputted from the acoustic signal packet decoding step or the loss handling step and

outputting a concatenated frame output acoustic signal;

the acoustic signal packet receiving method being characterized by comprising the step of,

in the receiving unit,

5   if a packet loss occurs, obtaining acoustic signal corresponding data having the same frame number as that of a lost frame from a packet in the receiving buffer by using delay amount control information included in a packet.

10. The acoustic signal packet receiving method according to

10   claim 9, characterized in that, in packet communication between one communication apparatus including both of the transmitting unit and the receiving unit and one or more other communication apparatuses including and both of the transmitting unit and the receiving unit,

the acoustic signal packet receiving method comprises:

15   in the receiving unit,

both or one of a first determination step of determining a jitter state of a received packet and a second determination step of determining a lost state of a received packet;

the step of determining the number of packets to be stored in a

20   receiving buffer by using the result of the determination made at any of the determination steps; and

the step of sending the number of packets to be stored in the receiving buffer to the transmitting unit in the same communication apparatus.

25   11. The acoustic signal packet receiving method according to claim 9, characterized in that, in packet communication between one communication apparatus including both of the transmitting unit and the

receiving unit and one or more other apparatuses including both of the transmitting unit and the receiving unit,

the acoustic signal packet receiving method comprises the steps of:

in the receiving unit,

5 measuring the number of packets stored in the receiving buffer (hereinafter referred to as the "remaining buffer amount"); and

sending the remaining buffer amount to the transmitting unit in the same communication apparatus.

12. An acoustic signal packet communicating system in which

10 packet communication is performed between one communication apparatus including at least a transmitting unit and one or more other communication apparatuses including at least a receiving apparatus,

the transmitting unit having:

means for dividing an acoustic signal such as a voice or music

15 signal into given time segments called frames to generate a frame acoustic signal;

means for generating data corresponding to the frame acoustic signal (hereinafter referred to as the "acoustic signal corresponding data" from the frame acoustic signal; and

20 means for containing the frame acoustic signal and the acoustic signal corresponding data in packets and transmitting the packets;

the receiving unit having:

means for storing received packets in a receiving buffer;

means for specifying the frame number of a frame to be extracted;

25 loss detecting means for determining whether or not a packet containing a frame acoustic signal associated with the frame number of the frame to be extracted is stored in the receiving buffer;

acoustic signal packet decoding means for, if it is determined in the loss detecting means that the packet containing the frame acoustic signal associated with the frame number of the frame to be extracted is stored in the receiving buffer, extracting the frame acoustic signal from the packet stored in

5 the receiving buffer and providing the frame acoustic signal as a frame output acoustic signal;

loss handling means for, if it is determined in the loss detecting means that the packet containing the frame acoustic signal associated with the frame number of the frame to be extracted is not stored in the receiving buffer

10 (hereinafter referred to as "if a packet loss occurs"), extracting an acoustic signal corresponding data for the frame (hereinafter referred to as the "lost frame") from a packet stored in the receiving buffer and generating a frame output acoustic signal by using the acoustic signal corresponding data; and

means for concatenating frame output acoustic signals outputted

15 from the acoustic signal packet decoding means or the loss handling means and outputting the concatenated frame output acoustic signal;

the acoustic signal packet communicating system being characterized in that:

the transmitting unit has means for including, in the same packet

20 that contains a frame acoustic signal, acoustic signal corresponding data for a frame having a frame number different by a value specified by delay amount control information from the frame number of the packet and the delay amount control information; and

the receiving unit has means for, if a packet loss occurs, obtaining

25 acoustic signal corresponding data having the same frame number as that of a lost frame from the packet in the receiving buffer by using the delay amount control information included in the packet.

13. An acoustic signal packet communicating apparatus comprising:

a transmitting unit having:

means for dividing an acoustic signal such as a voice or music signal into given time segments called frames to generate a frame acoustic signal; and

means for generating data corresponding to the frame acoustic signal (hereinafter referred to as "acoustic signal corresponding data") from the frame acoustic signal; and

means for containing the frame acoustic signal and the acoustic signal corresponding data in packets and transmitting the packets; and

a receiving unit having:

means for storing received packets in a receiving buffer;

means for specifying the number of a frame to be extracted;

loss detecting means for determining whether or not a packet containing a frame acoustic signal associated with the number of the frame to be extracted is stored in the receiving buffer;

acoustic signal packet decoding means for, if it is determined in the loss detecting means that the packet containing the frame acoustic signal associated with the number of the frame to be extracted is stored in the receiving buffer, extracting the frame acoustic signal from the packet stored in the receiving buffer and providing the frame acoustic signal as a frame output acoustic signal;

loss handling means for, if it is determined in the loss detecting means that the packet containing the frame acoustic signal associated with the number of the frame to be extracted is not stored in the receiving buffer (hereinafter referred to as "if a packet loss occurs"), extracting acoustic signal

corresponding data for the frame (hereinafter referred to as a "lost frame") from a packet stored in the receiving buffer and generating a frame output acoustic signal by using the acoustic signal corresponding data; and

means for concatenating frame output acoustic signals outputted from the acoustic signal packet decoding means or the loss handling means and outputting the concatenated frame output acoustic signal,

the acoustic signal packet communicating apparatus being characterized in that:

the transmitting unit has means for including, in the same packet that contains the frame acoustic signal, acoustic signal corresponding data for a frame having a frame number different by a value specified by delay amount control information from the frame number of the packet and delay amount control information and transmitting the packet; and

the receiving unit has means for, if a packet loss occurs, obtaining acoustic signal corresponding data having the same frame number as that of a lost frame from the packet in the receiving buffer by using the delay amount control information included in the packet.

14. The acoustic signal packet communicating apparatus according to claim 13, characterized in that:

the receiving unit has both or one of first determining means for determining a jitter state of a received packet and second determining means for determining a loss state of a received packet; and

means for determining the number of packets to be stored in a receiving buffer (hereinafter referred to as the "targeted value of the number of stored packets") by using the result of the determination made in any of the determining means; and

the transmitting unit has means for setting the delay amount control

information to a value less than or equal to the targeted value of the number of stored packets.

15.   The acoustic signal packet communication apparatus according to claim 13, characterized in that:

the receiving unit has both or one of first determining means for determining a jitter state of a received packet and second determining means for determining a loss state of a received packet; and

means for determining the number of packets to be stored in a receiving buffer (hereinafter referred to as the "targeted value of the number of stored packets") by using the result of the determination made in the determining means; and

the transmitting unit has means for containing the targeted value of the number of stored packets in a packet as information for specifying delay amount control information to be set in the transmitting unit at the other end of communication and transmitting the packet.

16.   The acoustic signal packet communicating apparatus according to claim 13, characterized in that:

the receiving unit has means for measuring the number of packets stored in the receiving buffer (hereinafter referred to as the "remaining buffer amount"); and

the transmitting unit has means for including the remaining buffer amount in the same packet that contains the frame acoustic signal as information for specifying delay amount control information to be set in the transmitting unit at the other end of communication and transmitting the packet.

17.   An acoustic signal packet communicating program for causing a computer to perform the steps of the acoustic signal packet communicating

method according to claim 1.

18. An acoustic signal packet transmitting program for causing a computer to perform the steps of the acoustic signal packet transmitting method according to claim 5.

5   19. An acoustic signal packet receiving program for causing a computer to perform the steps of the acoustic signal packet receiving method according to claim 9.